



Surgical Site Infection (SSI) Event

Introduction: In 2010, an estimated 16 million operative procedures were performed in the United States.¹ A recent prevalence study found that SSIs were the most common healthcare-associated infection, accounting for 31% of all HAIs among hospitalized patients.² NHSN data for 2006-2008 (16,147 SSIs following 849,659 operative procedures) showed an overall SSI rate of 1.9%.³

While advances have been made in infection control practices, including improved operating room ventilation, sterilization methods, barriers, surgical technique, and availability of antimicrobial prophylaxis, SSIs remain a substantial cause of morbidity and an associated mortality rate of 3% has been attributed to them.⁴ Of this, 75% of the mortality rate has been directly related to the SSI.⁴

Surveillance of SSI with feedback of appropriate data to surgeons has been shown to be an important component of strategies to reduce SSI risk.^{5,6,7,8} A successful surveillance program includes the use of epidemiologically-sound infection definitions and effective surveillance methods, stratification of SSI rates according to risk factors associated with SSI development, and data feedback.^{6,7} Recommendations are outlined in the CDC's *Guideline for Prevention of Surgical Site Infection, 1999*.⁸

Settings: Surveillance of surgical patients will occur in any inpatient and/or outpatient setting where the selected NHSN operative procedure(s) are performed.

Requirements: Perform surveillance for SSI following at least one NHSN operative procedure category (Table 1) as indicated in the *Patient Safety Monthly Reporting Plan* ([CDC 57.106](#)). Collect SSI (numerator) and operative procedure category (denominator) data on all procedures included in the selected procedure categories for at least one month. A procedure must meet the NHSN definition of an operative procedure in order to be included in the surveillance.

SSI monitoring requires active, patient-based, prospective surveillance. Post-discharge and ante-discharge surveillance methods should be used to detect SSIs following inpatient and outpatient operative procedures. These methods include 1) direct examination of patients' wounds during follow-up visits to either surgery clinics or physicians' offices, 2) review of medical records or surgery clinic patient records, 3) surgeon surveys by mail or telephone, and 4) patient surveys by mail or telephone (though patients may have a difficult time assessing their infections). Any combination of these methods is acceptable for use; however, CDC criteria for SSI must be used. To minimize Infection Preventionists' (IPs) workload of collecting denominator data, operating room data may be downloaded (see file specifications at:

http://www.cdc.gov/nhsn/PDFs/ImportingProcedureData_current.pdf).

An SSI will be associated with a particular NHSN operative procedure and the facility in which that procedure was performed. Refer to the NHSN application's Help system for instruction on linking an SSI to an operative procedure.



The *International Classification of Diseases, 9th Revision Clinical Modifications* (ICD-9-CM) codes, which are defined by the ICD-9 Coordination and Maintenance Committee of the National Center for Health Statistics and the Centers for Medicare and Medicaid Services (CMS), are developed as a tool for classification of morbidity data. The wide use enables the grouping of surgery types for the purpose of determining SSI rates. ICD-9-CM codes are updated annually in October and NHSN operative procedure categories are subsequently updated and changes shared with NHSN users. Table 1 lists NHSN operative procedure category groupings by ICD-9-CM codes. Because ambulatory surgery centers and hospital outpatient surgery departments may not use ICD-9-CM procedure codes, Table 1 provides Current Procedural Terminology (CPT) code mapping for certain NHSN operative procedure categories to assist users in determining the correct NHSN code to report for outpatient surgery cases. However, CPT codes do not take precedence over ICD-9-CM codes when determining the appropriate NHSN operative procedure category for inpatient surgery cases. Table 1 also includes a general description of the types of operations contained in the NHSN operative procedure categories.

Definitions:

An NHSN operative procedure is a procedure

- that is performed on a patient who is an NHSN inpatient or an NHSN outpatient;
and
- takes place during an operation (defined as a single trip to the operating room [OR] where a surgeon makes at least one incision through the skin or mucous membrane, including laparoscopic approach, and closes the incision primarily* before the patient leaves the OR);
and
- that is included in Table 1.

*Primary closure is defined as closure of all tissue levels, regardless of the presence of wires, wicks, drains, or other devices or objects extruding through the incision. However, regardless of whether anything is extruding from the incision, if the skin edges are not fully reapproximated for the entire length of the incision (e.g., are loosely closed with gaps between suture/staple points), the incision is not considered primarily closed and therefore the procedure would not be considered an operation. In such cases, any subsequent infection would not be considered an SSI, although it may be an HAI if it meets criteria for another specific infection site (e.g., skin or soft tissue infection).

NHSN Inpatient: A patient whose date of admission to the healthcare facility and the date of discharge are different calendar days.

NHSN Outpatient: A patient whose date of admission to the healthcare facility and date of discharge are the same calendar day.

Operating Room (OR): A patient care area that met the Facilities Guidelines Institute's (FGI) or American Institute of Architects' (AIA) criteria for an operating room when it was constructed or renovated.⁹ This may include an operating room, C-Section room, interventional radiology room, or a cardiac catheterization lab.



Table 1. NHSN Operative Procedure Category Mappings to ICD-9-CM Codes and CPT Codes
CPT codes are to be used for outpatient surgery cases only.

Legacy Code	Operative Procedure	Description	ICD-9-CM Codes / CPT Codes
AAA	Abdominal aortic aneurysm repair	Resection of abdominal aorta with anastomosis or replacement	38.34, 38.44, 38.64
AMP	Limb amputation	Total or partial amputation or disarticulation of the upper or lower limbs, including digits	84.00-84.19, 84.91
APPY	Appendix surgery	Operation of appendix (not incidental to another procedure)	47.01, 47.09, 47.2, 47.91, 47.92, 47.99
AVSD	Shunt for dialysis	Arteriovenostomy for renal dialysis	39.27, 39.42
BILI	Bile duct, liver or pancreatic surgery	Excision of bile ducts or operative procedures on the biliary tract, liver or pancreas (does not include operations only on gallbladder)	50.0, 50.12, 50.14, 50.21-50.23, 50.25, 50.26, 50.29, 50.3, 50.4, 50.61, 50.69, 51.31-51.37, 51.39, 51.41-51.43, 51.49, 51.51, 51.59, 51.61-51.63, 51.69, 51.71, 51.72, 51.79, 51.81-51.83, 51.89, 51.91-51.95, 51.99, 52.09, 52.12, 52.22, 52.3, 52.4, 52.51-52.53, 52.59-52.6, 52.7, 52.92, 52.95, 52.96, 52.99
BRST	Breast surgery	Excision of lesion or tissue of breast including radical, modified, or quadrant resection, lumpectomy, incisional biopsy, or mastoplasty	85.12, 85.20-85.23, 85.31-85.36, 85.41-85.48, 85.50, 85.53-85.55, 85.6, 85.70-85.76, 85.79, 85.93-85.96 19101, 19112, 19120, 19125, 19126, 19300, 19301, 19302, 19303, 19304, 19305, 19306, 19307, 19316, 19318, 19324, 19325, 19328, 19330, 19340, 19342, 19350, 19355, 19357, 19361, 19364, 19366, 19367, 19368, 19369, 19370, 19371, 19380
CARD	Cardiac surgery	Procedures on the heart; includes valves or septum; does not include coronary artery bypass graft, surgery on vessels, heart transplantation, or pacemaker implantation	35.00-35.04, 35.06, 35.08, 35.10-35.14, 35.20-35.28, 35.31-35.35, 35.39, 35.42, 35.50, 35.51, 35.53, 35.54, 35.60-35.63, 35.70-35.73, 35.81-35.84, 35.91-35.95, 35.98-35.99, 37.10-37.12, 37.31-37.33, 37.35-37.37, 37.41, 37.49, 37.60



Legacy Code	Operative Procedure	Description	ICD-9-CM Codes / CPT Codes
CEA	Carotid endarterectomy	Endarterectomy on vessels of head and neck (includes carotid artery and jugular vein)	38.12
CBGB	Coronary artery bypass graft with both chest and donor site incisions	Chest procedure to perform direct revascularization of the heart; includes obtaining suitable vein from donor site for grafting	36.10-36.14, 36.19
CBGC	Coronary artery bypass graft with chest incision only	Chest procedure to perform direct vascularization of the heart using, for example the internal mammary (thoracic) artery	36.15-36.17, 36.2
CHOL	Gallbladder surgery	Cholecystectomy and cholecystotomy	<u>51.03, 51.04, 51.13, 51.21-51.24</u> 47480, 47562, 47563, 47564, 47600, 47605, 47610, 47612, 47620
COLO	Colon surgery	Incision, resection, or anastomosis of the large intestine; includes large-to-small and small-to-large bowel anastomosis; does not include rectal operations	<u>17.31-17.36, 17.39, 45.03, 45.26, 45.41, 45.49, 45.52, 45.71-45.76, 45.79, 45.81-45.83, 45.92-45.95, 46.03, 46.04, 46.10, 46.11, 46.13, 46.14, 46.43, 46.52, 46.75, 46.76, 46.94</u> 44140, 44141, 44143, 44144, 44145, 44146, 44147, 44150, 44151, 44160, 44204, 44205, 44206, 44207, 44208, 44210
CRAN	Craniotomy	Excision repair, or exploration of the brain or meninges; does not include taps or punctures	01.12, 01.14, 01.20-01.25, 01.28, 01.29, 01.31, 01.32, 01.39, 01.41, 01.42, 01.51-01.53, 01.59, 02.11-02.14, 02.91-02.93, 07.51-07.54, 07.59, 07.61-07.65, 07.68, 07.69, 07.71, 07.72, 07.79, 38.01, 38.11, 38.31, 38.41, 38.51, 38.61, 38.81, 39.28
CSEC	Cesarean section	Obstetrical delivery by Cesarean section	74.0, 74.1, 74.2, 74.4, 74.91, 74.99
FUSN	Spinal fusion	Immobilization of spinal column	81.00-81.08



Legacy Code	Operative Procedure	Description	ICD-9-CM Codes / CPT Codes
FX	Open reduction of fracture	Open reduction of fracture or dislocation of long bones with or without internal or external fixation; does not include placement of joint prosthesis	79.21, 79.22, 79.25, 79.26, 79.31, 79.32, 79.35, 79.36, 79.51, 79.52, 79.55, 79.56 23615, 23616, 23630, 23670, 23680, 24515, 24516, 24538, 24545, 24546, 24575, 24579, 24586, 24587, 24635, 24665, 24666, 24685, 25337, 25515, 25525, 25526, 25545, 25574, 25575, 25607, 25608, 25609, 25652, 27236, 27244, 27245, 27248, 27254, 27269, 27283, 27506, 27507, 27511, 27513, 27514, 27535, 27536, 27540, 27758, 27759, 27766, 27769, 27784, 27792, 27814, 27822, 27826, 27827, 27828
GAST	Gastric surgery	Incision or excision of stomach; includes subtotal or total gastrectomy; does not include vagotomy and fundoplication	43.0, 43.42, 43.49, 43.5, 43.6, 43.7, 43.81, 43.82, 43.89, 43.91, 43.99, 44.15, 44.21, 44.29, 44.31, 44.38-44.42, 44.49, 44.5, 44.61-44.65, 44.68-44.69, 44.95-44.98
HER	Herniorrhaphy	Repair of inguinal, femoral, umbilical, or anterior abdominal wall hernia; does not include repair of diaphragmatic or hiatal hernia or hernias at other body sites	17.11-17.13, 17.21-17.24, 53.00-53.05, 53.10-53.17, 53.21, 53.29, 53.31, 53.39, 53.41-53.43, 53.49, 53.51, 53.59, 53.61-53.63, 53.69 49491, 49492, 49495, 49496, 49500, 49501, 49505, 49507, 49520, 49521, 49525, 49550, 49553, 49555, 49557, 49560, 49561, 49565, 49566, 49568, 49570, 49572, 49580, 49582, 49585, 49587, 49590, 49650, 49651, 49652, 49653, 49654, 49655, 49656, 49657, 49659, 55540
HPRO	Hip prosthesis	Arthroplasty of hip	00.70-00.73, 00.85-00.87, 81.51-81.53 27125, 27130, 27132, 27134, 27137, 27138, 27236, 27299
HTP	Heart transplant	Transplantation of heart	37.51-37.55



Legacy Code	Operative Procedure	Description	ICD-9-CM Codes / CPT Codes
HYST	Abdominal hysterectomy	Abdominal hysterectomy; includes that by laparoscope	68.31, 68.39, 68.41, 68.49, 68.61, 68.69 58150, 58152, 58180, 58200, 58210, 58541, 58542, 58543, 58544, 58548, 58570, 58571, 58572, 58573, 58951, 58953, 58954, 58956
KPRO	Knee prosthesis	Arthroplasty of knee	00.80-00.84, 81.54, 81.55 27438, 27440, 27441, 27442, 27443, 27445, 27446, 27447, 27486, 27487
KTP	Kidney transplant	Transplantation of kidney	55.61, 55.69
LAM	Laminectomy	Exploration or decompression of spinal cord through excision or incision into vertebral structures	03.01, 03.02, 03.09, 80.50, 80.51, 80.53, 80.54*, 80.59, 84.60-84.69, 84.80-84.85
LTP	Liver transplant	Transplantation of liver	50.51, 50.59
NECK	Neck surgery	Major excision or incision of the larynx and radical neck dissection; does not include thyroid and parathyroid operations	30.1, 30.21, 30.22, 30.29, 30.3, 30.4, 31.45, 40.40-40.42
NEPH	Kidney surgery	Resection or manipulation of the kidney with or without removal of related structures	55.01, 55.02, 55.11, 55.12, 55.24, 55.31, 55.32, 55.34, 55.35, 55.39, 55.4, 55.51, 55.52, 55.54, 55.91
OVRY	Ovarian surgery	Operations on ovary and related structures	65.01, 65.09, 65.12, 65.13, 65.21-65.25, 65.29, 65.31, 65.39, 65.41, 65.49, 65.51-65.54, 65.61-65.64, 65.71-65.76, 65.79, 65.81, 65.89, 65.92-65.95, 65.99
PACE	Pacemaker surgery	Insertion, manipulation or replacement of pacemaker	00.50-00.54, 17.51, 17.52, 37.70-37.77, 37.79-37.83, 37.85-37.87, 37.89, 37.94-37.99
PRST	Prostate surgery	Suprapubic, retropubic, radical, or perineal excision of the prostate; does not include transurethral resection of the prostate	60.12, 60.3, 60.4, 60.5, 60.61, 60.69
PVBY	Peripheral vascular bypass surgery	Bypass operations on peripheral arteries	39.29



Legacy Code	Operative Procedure	Description	ICD-9-CM Codes / CPT Codes
REC	Rectal surgery	Operations on rectum	48.25, 48.35, 48.40, 48.42, 48.43, 48.49-48.52, 48.59, 48.61-48.65, 48.69, 48.74
RFUSN	Refusion of spine	Refusion of spine	81.30-81.39
SB	Small bowel surgery	Incision or resection of the small intestine; does not include small-to-large bowel anastomosis	45.01, 45.02, 45.15, 45.31-45.34, 45.51, 45.61-45.63, 45.91, 46.01, 46.02, 46.20-46.24, 46.31, 46.39, 46.41, 46.51, 46.71-46.74, 46.93
SPLE	Spleen surgery	Resection or manipulation of spleen	41.2, 41.33, 41.41-41.43, 41.5, 41.93, 41.95, 41.99
THOR	Thoracic surgery	Noncardiac, nonvascular thoracic surgery; includes pneumonectomy and hiatal hernia repair or diaphragmatic hernia repair (except through abdominal approach)	32.09, 32.1, 32.20-32.23, 32.25, 32.26, 32.29, 32.30, 32.39, 32.41, 32.49, 32.50, 32.59, 32.6, 32.9, 33.0, 33.1, 33.20, 33.25, 33.28, 33.31-33.34, 33.39, 33.41-33.43, 33.48, 33.49, 33.98, 33.99, 34.01-34.03, 34.06, 34.1, 34.20, 34.26, 34.3, 34.4, 34.51, 34.52, 34.59, 34.6, 34.81-34.84, 34.89, 34.93, 34.99, 53.80-53.84
THYR	Thyroid and/or parathyroid surgery	Resection or manipulation of thyroid and/or parathyroid	06.02, 06.09, 06.12, 06.2, 06.31, 06.39, 06.4, 06.50-06.52, 06.6, 06.7, 06.81, 06.89, 06.91-06.95, 06.98, 06.99
VHYS	Vaginal hysterectomy	Vaginal hysterectomy; includes that by laparoscope	68.51, 68.59, 68.71, 68.79
VSHN	Ventricular shunt	Ventricular shunt operations, including revision and removal of shunt	02.21, 02.22, 02.31-02.35, 02.39, 02.42, 02.43, 54.95 [†]
XLAP	Exploratory laparotomy	Abdominal operations not involving the gastrointestinal tract or biliary system; includes diaphragmatic hernia repair through abdominal approach	53.71, 53.72, 53.75, 54.0, 54.11, 54.12, 54.19, 54.3, 54.4, 54.51, 54.59, 54.61, 54.63, 54.64, 54.71-54.75, 54.92, 54.93

*If the 80.54 procedure was a percutaneous repair of the anulus fibrosus, it is not considered an NHSN operative procedure and should not be included in LAM denominator data.

[†]Include only if this procedure involves ventricular shunt (i.e., is not a Ladd procedure to repair malrotation of intestines).



For a complete list of all ICD-9-CM codes mapped to their assignment as an NHSN operative procedure category, a surgical procedure other than an NHSN operative procedure (OTH), or a non-operative procedure (NO), see ICD-9-CM Procedure Code Mapping to NHSN Operative Procedure Categories at <http://www.cdc.gov/nhsn/XLS/ICD-9-cmCODEScurrent.xlsx>.

ASA score: Assessment by the anesthesiologist of the patient's preoperative physical condition using the American Society of Anesthesiologists' (ASA) Classification of Physical Status.¹⁰ Patient is assigned one of the following which may be used as one element of SSI risk adjustment:

1. Normally healthy patient
2. Patient with mild systemic disease
3. Patient with severe systemic disease that is not incapacitating
4. Patient with an incapacitating systemic disease that is a constant threat to life
5. Moribund patient who is not expected to survive for 24 hours with or without the operation.

NOTE: If coded as expired or as organ donor, report as ASA = 5.

Duration of operative procedure: The interval in hours and minutes between skin incision and primary skin closure. See also definition of [primary closure](#) and the [Denominator Data](#) reporting instructions in this chapter.

Emergency operative procedure: A nonelective, unscheduled operative procedure. Emergency operative procedures are those that do not allow for the standard immediate preoperative preparation normally done within the facility for a scheduled operation (e.g., stable vital signs, adequate antiseptic skin preparation, colon decontamination in advance of colon surgery, etc.).

General anesthesia: The administration of drugs or gases that enter the general circulation and affect the central nervous system to render the patient pain free, amnesic, unconscious, and often paralyzed with relaxed muscles.

Scope: An instrument used to visualize the interior of a body cavity or organ. In the context of an NHSN operative procedure, use of a scope involves creation of several small incisions to perform or assist in the performance of an operation rather than use of a traditional larger incision (i.e., open approach). Robotic assistance is considered equivalent to use of a scope for NHSN SSI surveillance. See also [Instructions for Completion of Denominator for Procedure](#) Form and both [Numerator Data](#) and [Denominator Data](#) reporting instructions in this chapter.

Trauma: Blunt or penetrating injury.

Wound class: An assessment of the degree of contamination of a surgical wound at the time of the operation. Wound class should be assigned by a person involved in the surgical procedure, e.g., surgeon, circulating nurse, etc. The wound class system used in NHSN is an adaptation of the American College of Surgeons wound classification schema⁸. Wounds are divided into four classes:

Clean: An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tracts are not entered. In addition, clean



wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow nonpenetrating (blunt) trauma should be included in this category if they meet the criteria.

NOTE: The following NHSN operative procedure categories are NEVER considered to have a clean wound classification: APPY, BILI, CHOL, COLO, REC, SB, and VHYS.

Clean-Contaminated: Operative wounds in which the respiratory, alimentary, genital*, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.*Includes female and male reproductive tracts.

Contaminated: Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute, nonpurulent inflammation is encountered are included in this category.

Dirty or Infected: Includes old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.

Table 2. Surgical Site Infection Criteria

Criterion	Surgical Site Infection (SSI)
	Superficial incisional SSI Must meet the following criterion:
	Infection occurs within 30 days after any NHSN operative procedure, including those coded as 'OTH'* <i>and</i> involves only skin and subcutaneous tissue of the incision <i>and</i> patient has at least one of the following: a. purulent drainage from the superficial incision. b. organisms isolated from an aseptically-obtained culture of fluid or tissue from the superficial incision. c. superficial incision that is deliberately opened by a surgeon and is culture-positive or not cultured <i>and</i> patient has at least one of the following signs or symptoms: pain or tenderness; localized swelling; redness; or heat. A culture negative finding does not meet this criterion. d. diagnosis of a superficial incisional SSI by the surgeon or attending physician.
	* http://www.cdc.gov/nhsn/XLS/ICD-9-cmCODEScurrent.xlsx



Comments	<p>There are two specific types of superficial incisional SSIs:</p> <ol style="list-style-type: none"> 1. Superficial Incisional Primary (SIP) – a superficial incisional SSI that is identified in the primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB) 2. Superficial Incisional Secondary (SIS) – a superficial incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site incision for CBGB)
REPORTING INSTRUCTIONS	<ul style="list-style-type: none"> • Do not report a stitch abscess (minimal inflammation and discharge confined to the points of suture penetration) as an infection. • Do not report a localized stab wound or pin site infection as SSI. While it would be considered either a skin (SKIN) or soft tissue (ST) infection, depending on its depth, it is not reportable under this module. • Diagnosis of “cellulitis”, by itself, does not meet criterion d for superficial incisional SSI. • If the superficial incisional infection extends into the fascial and/or muscle layers, report as a deep incisional SSI only. • An infected circumcision site in newborns is classified as CIRC. Circumcision is not an NHSN operative procedure. CIRC is not reportable under this module. • An infected burn wound is classified as BURN and is not reportable under this module.
	<p>Deep incisional SSI Must meet the following criterion:</p>
	<p>Infection occurs within 30 or 90 days after the NHSN operative procedure according to the list in Table 3 <i>and</i> involves deep soft tissues of the incision (e.g., fascial and muscle layers) <i>and</i> patient has at least one of the following:</p> <ol style="list-style-type: none"> a. purulent drainage from the deep incision. b. a deep incision that spontaneously dehisces or is deliberately opened by a surgeon and is culture-positive or not cultured <i>and</i> patient has at least one of the following signs or symptoms: fever (>38°C); localized pain or tenderness. A culture-negative finding does not meet this criterion. c. an abscess or other evidence of infection involving the deep incision that is found on direct examination, during invasive procedure, or by histopathologic examination or imaging test. d. diagnosis of a deep incisional SSI by a surgeon or attending physician.
Comments	<p>There are two specific types of deep incisional SSIs:</p> <ol style="list-style-type: none"> 1. Deep Incisional Primary (DIP) – a deep incisional SSI that is identified



	<p>in a primary incision in a patient that has had an operation with one or more incisions (e.g., C-section incision or chest incision for CBGB)</p> <p>2. Deep Incisional Secondary (DIS) – a deep incisional SSI that is identified in the secondary incision in a patient that has had an operation with more than one incision (e.g., donor site incision for CBGB)</p>
REPORTING INSTRUCTION	<ul style="list-style-type: none"> Classify infection that involves both superficial and deep incisional sites as deep incisional SSI. Classify infection that involves superficial incisional, deep incisional, and organ/space sites as deep incisional SSI. This is considered a complication of the incision.

	<p>Organ/Space SSI</p> <p>Must meet the following criterion:</p>
	<p>Infection occurs within 30 or 90 days after the NHSN operative procedure according to the list in Table 3</p> <p><i>and</i></p> <p>infection involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure</p> <p><i>and</i></p> <p>patient has at least one of the following:</p> <ol style="list-style-type: none"> purulent drainage from a drain that is placed into the organ/space organisms isolated from an aseptically-obtained culture of fluid or tissue in the organ/space an abscess or other evidence of infection involving the organ/space that is found on direct examination, during invasive procedure, or by histopathologic examination or imaging test diagnosis of an organ/space SSI by a surgeon or attending physician <p><i>and</i></p> <p>meets at least one criterion for a specific organ/space infection site listed in Table 4.</p>
Comments	<p>Because an organ/space SSI involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure, the criterion for infection at these body sites must be met in addition to the organ/space SSI criteria. For example, an appendectomy with subsequent subdiaphragmatic abscess would be reported as an organ/space SSI at the intraabdominal specific site (SSI-IAB) when both organ/space SSI and IAB criteria are met. Table 4 list the specific sites that must be used to differentiate organ/space SSI. These criteria are in the HAI Definitions chapter.</p>
REPORTING INSTRUCTIONS	<ul style="list-style-type: none"> If a patient has an infection in the organ/space being operated on in the first 2-day period of hospitalization and the surgical incision was closed primarily, subsequent continuation of this infection type during the remainder of the surveillance period is considered an organ/space SSI, if



	<p>organ/space SSI and site-specific infection criteria are met. Rationale: Risk of continuing or new infection is considered to be minimal when a surgeon elects to close a wound primarily.</p> <ul style="list-style-type: none">• Occasionally an organ/space infection drains through the incision and is considered a complication of the incision. Therefore, classify it as a deep incisional SSI.• Report mediastinitis following cardiac surgery that is accompanied by osteomyelitis as SSI-MED rather than SSI-BONE.• If meningitis (MEN) and a brain abscess (IC) are present together after operation, report as SSI-IC.• Report CSF shunt infection as SSI-MEN if it occurs within 90 days of placement; if later or after manipulation/access, it is considered CNS-MEN and is not reportable under this module.• Report spinal abscess with meningitis as SSI-MEN following spinal surgery.
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Table 3. Surveillance Period for Deep Incisional or Organ/Space SSI Following Selected NHSN Operative Procedure Categories

30-day Surveillance			
Code	Operative Procedure	Code	Operative Procedure
AAA	Abdominal aortic aneurysm repair	LAM	Laminectomy
AMP	Limb amputation	LTP	Liver transplant
APPY	Appendix surgery	NECK	Neck surgery
AVSD	Shunt for dialysis	NEPH	Kidney surgery
BILI	Bile duct, liver or pancreatic surgery	OVRY	Ovarian surgery
CEA	Carotid endarterectomy	PRST	Prostate surgery
CHOL	Gallbladder surgery	REC	Rectal surgery
COLO	Colon surgery	SB	Small bowel surgery
CSEC	Cesarean section	SPLE	Spleen surgery
GAST	Gastric surgery	THOR	Thoracic surgery
HTP	Heart transplant	THYR	Thyroid and/or parathyroid surgery
HYST	Abdominal hysterectomy	VHYS	Vaginal hysterectomy
KTP	Kidney transplant	XLAP	Exploratory Laparotomy
		OTH	Other operative procedures not included in the NHSN categories
90-day Surveillance			
Code	Operative Procedure		
BRST	Breast surgery		
CARD	Cardiac surgery		
CBGB	Coronary artery bypass graft with both chest and donor site incisions		
CBGC	Coronary artery bypass graft with chest incision only		
CRAN	Craniotomy		
FUSN	Spinal fusion		
FX	Open reduction of fracture		
HER	Herniorrhaphy		
HPRO	Hip prosthesis		
KPRO	Knee prosthesis		
PACE	Pacemaker surgery		
PVBY	Peripheral vascular bypass surgery		
RFUSN	Refusion of spine		
VSHN	Ventricular shunt		

NOTE: Superficial incisional SSIs are only followed for a 30-day period for all procedure types.



Table 4. *Specific Sites of an Organ/Space SSI.* Criteria for these sites can be found in the NHSN Help system (must be logged in to NHSN) or the [HAI Definitions](#) chapter.

Code	Site	Code	Site
BONE	Osteomyelitis	JNT	Joint or bursa
BRST	Breast abscess or mastitis	LUNG	Other infections of the respiratory tract
CARD	Myocarditis or pericarditis	MED	Mediastinitis
DISC	Disc space	MEN	Meningitis or ventriculitis
EAR	Ear, mastoid	ORAL	Oral cavity (mouth, tongue, or gums)
EMET	Endometritis	OREP	Other infections of the male or female reproductive tract
ENDO	Endocarditis	OUTI	Other infections of the urinary tract
EYE	Eye, other than conjunctivitis	SA	Spinal abscess without meningitis
GIT	GI tract	SINU	Sinusitis
HEP	Hepatitis	UR	Upper respiratory tract
IAB	Intraabdominal, not specified elsewhere	VASC	Arterial or venous infection
IC	Intracranial, brain abscess or dura	VCUF	Vaginal cuff

Numerator Data: All patients having any of the procedures included in the selected NHSN operative procedure category(s) are monitored for signs of SSI. The *Surgical Site Infection (SSI)* form is completed for each such patient found to have an SSI. If no SSI events are identified during the surveillance month, check the “Report No Events” field in the Missing PA Events tab of the Incomplete/Missing List.

The [Instructions for Completion of the Surgical Site Infection](#) form include brief instructions for collection and entry of each data element on the form. The [SSI form](#) includes patient demographic information and information about the operative procedure, including the date and type of procedure. Information about the SSI includes the date of SSI, specific criteria met for identifying the SSI, when/how the SSI was detected, whether the patient developed a secondary bloodstream infection, whether the patient died, and the organisms isolated from cultures and the organisms’ antimicrobial susceptibilities.

REPORTING INSTRUCTIONS:

- Attributing SSI to a Procedure when Several are Performed on Different Dates:** If a patient has several NHSN operative procedures performed on different dates prior to an infection, report the operative procedure code of the operation that was performed most closely in time prior to the infection date, unless there is evidence that the infection was associated with a different operation.
- SSI after Laparoscopic Procedures:** Following a laparoscopic surgery, if more than one of the incisions should become infected, only report as a single SSI. If one incision meets criteria for a superficial incisional SSI and another meets criteria for a deep incisional SSI, count as only one deep incisional SSI.



3. **SSI after Breast (BRST) Procedures with More than One Incision:**
 - A single breast operative procedure (BRST) with multiple incisions on a single breast that are not laparoscopic should be reported as only one operative procedure. If more than one of the incisions should become infected, only report as a single SSI.
 - A BRST procedure with a secondary incision for tissue harvest (e.g., Transverse Rectus Abdominis Myocutaneous [TRAM] flap) should be reported as only one operative procedure. If the secondary incision gets infected, report as either SIS or DIS as appropriate.
4. **SSI after Procedures that Allow Secondary Incisions:** For procedures that allow for secondary incisions (i.e., BRST, CBGB, CEA, FUSN, REC, PVBY, RFUSN), the secondary incision site surveillance period will only be 30 days, as long as that site does not have retained implantable materials. For example, a saphenous vein harvest incision in a CBGB procedure is considered the secondary incision and is monitored for only 30 days after surgery for evidence of SSI, but the chest incision is monitored for 90 days.
5. **SSI After Colostomy Reversal:** In a colostomy reversal (take down) procedure, if colostomy stoma site and abdominal operative incision(s) are primarily closed and one or more of the incisions becomes infected, report only as one incisional SSI. If the stoma site is closed at the fascial/muscle layer but not superficially (e.g., left to heal by secondary intention) and the abdominal operative incision(s) is primarily closed, this is still considered an NHSN operative procedure and therefore if an organ/space infection develops, it is considered an SSI. However, if the stoma site becomes infected, it is considered skin or soft tissue infection, not an SSI.
6. **SSI Detected at Another Facility:** If an SSI is detected at a facility other than the one in which the operation was done, notify the IP of the index facility with enough detail so the infection can be reported to NHSN. When reporting the SSI, the index facility should indicate that Detected = RO.
7. **SSI Attribution after Surgical Procedure with More Than One Operative Procedure Category:** If more than one NHSN operative procedure category was performed through a single incision during a single trip to the operating room, attribute the SSI to the procedure that is thought to be associated with the infection. If it is not clear, as is often the case when the infection is a superficial incisional SSI, use the NHSN Principal Operative Procedure Category Selection Lists (Table 5) to select the operative procedure to which the SSI should be attributed.
8. **SSI Following an Implant:** When implanted material is left in place during an NHSN operative procedure with a 90-day surveillance period (e.g., KPRO, VSHN) and the implanted material or the area/structures contiguous with it are later manipulated for diagnostic or therapeutic purposes, organ/space infection can occur. In such a case, if organ/space infection develops during the 90-day surveillance period, the infection is not attributed to the operation in which the implant was inserted; instead it should be attributed to the latter procedure.



9. Reporting Instructions for Specific Post-operative Infection Scenarios:

- Once a patient is discharged from the index hospital, if the incision opens due to fall or other reasons and there was no evidence of incisional infection at the time of its opening (as defined by lack of those symptoms that make up the SSI definition), then subsequent infection of the incision is not considered an SSI or an HAI for the index hospital (if the patient was in a rehab facility when this occurred, it would be an HAI for that facility). This implies a mechanical reason for dehiscence rather than an infectious reason.
- Post-op patient is still hospitalized following surgery and his asymptomatic incision opens due to fall or other reasons (e.g., picking at it). If subsequent incisional infection develops, it is considered an HAI but not SSI.
- Post-op patient sustains an injury to the incision area but incision does not open. Later, incisional infection develops; this is considered an SSI.
- Post-op patient has an intact incision or status of incision is unknown (e.g., dressing never changed so no one has seen the incision), or it is noted that patient showered/bathed “too early” post-op, or it is noted that the patient was incontinent and incision was or may have been contaminated, or patient got intact incision dirty, then subsequent incisional infection is considered an SSI.
- Post-op patient has skin condition (e.g., dermatitis, blister, impetigo) near intact incision, and then subsequently develops incisional infection within the follow-up surveillance period; this is an SSI.
- Patient has remote site infection, either prior to or after an operation, or has a manipulation that “seeds” operative site (e.g., dental work), and later develops deep incisional or organ/space infection; this is an SSI if it occurs in the follow up surveillance period.



Table 5. NHSN Principal Operative Procedure Category Selection Lists

The following lists are derived from the operative procedures listed in Table 1. The categories with the highest risk of SSI are listed before those with lower risks.

Priority	Code	Abdominal Operations
1	LTP	Liver transplant
2	COLO	Colon surgery
3	BILI	Bile duct, liver or pancreatic surgery
4	SB	Small bowel surgery
5	REC	Rectal surgery
6	KTP	Kidney transplant
7	GAST	Gastric surgery
8	AAA	Abdominal aortic aneurysm repair
9	HYST	Abdominal hysterectomy
10	CSEC	Cesarean section
11	XLAP	Laparotomy
12	APPY	Appendix surgery
13	HER	Herniorrhaphy
14	NEPH	Kidney surgery
15	VHYS	Vaginal Hysterectomy
16	SPLE	Spleen surgery
17	CHOL	Gall bladder surgery
18	OVRV	Ovarian surgery

Priority	Code	Thoracic Operations
1	HTP	Heart transplant
2	CBGB	Coronary artery bypass graft with donor incision(s)
3	CBGC	Coronary artery bypass graft, chest incision only
4	CARD	Cardiac surgery
5	THOR	Thoracic surgery
Priority	Code	Neurosurgical (Spine) Operations
1	RFUSN	Refusion of spine
2	CRAN	Crainiotomy
3	FUSN	Spinal fusion
4	LAM	Laminectomy
Priority	Code	Neurosurgical (Brain) Operations
1	VSHN	Ventricular shunt
2	RFUSN	Refusion of spine
3	CRAN	Craniotomy
4	FUSN	Spinal fusion
5	LAM	Laminectomy
Priority	Code	Neck Operations
1	NECK	Neck surgery
2	THYR	Thyroid and or parathyroid surgery



Denominator Data: For all patients having any of the procedures included in the NHSN Operative Procedure category(s) selected for surveillance during the month, complete the [Denominator for Procedure](#) form. The data are collected individually for each operative procedure performed during the month specified on the [Patient Safety Monthly Reporting Plan](#). The [Instructions for Completion of the Denominator for Procedure](#) Form include brief instructions for collection and entry of each data element on the form.

REPORTING INSTRUCTIONS:

- 1. Different Operative Procedure Categories Performed During Same Trip to the OR:** If procedures in more than one NHSN operative procedure category are performed during the same trip to the operating room through the same or different incisions, a *Denominator for Procedure* form is reported for each NHSN operative procedure category being monitored. For example, if a CARD and CBGC are done through the same incision, a *Denominator for Procedure* form is reported for each. In another example, if following a motor vehicle accident, a patient has an open reduction of fracture (FX) and splenectomy (SPLE) performed during the same trip to the operating room and both procedure categories are being monitored, complete a *Denominator for Procedure* form for each.

EXCEPTION: If a patient has both a CBGC and CBGB during the same trip to the operating room, report only as a CBGB. Only report as a CBGC when there is a chest incision only. CBGB and CBGC are never reported for the same patient for the same trip to the operating room. The time from chest incision to chest primary closure is reported as the duration of the procedure.

- 2. Duration of the Procedure when More than One Category of NHSN Operative Procedure is Done Through the Same Incision:** If more than one NHSN operative procedure category is performed through the same incision during the same trip to the operating room, record the combined duration of all procedures, which is the time from skin incision to primary closure. For example, if a CBGC and a CARD are performed on a patient during the same trip to the operating room, the time from skin incision to primary closure is reported for both operative procedures.
- 3. Same Operative Procedure Category but Different ICD-9-CM Codes During Same Trip to the OR:** If procedures of different ICD-9-CM codes from the same NHSN operative procedure category are performed through the same incision, record only one procedure for that category. For example, a facility is performing surveillance for CARD procedures. A patient undergoes a replacement of both the mitral and tricuspid valves (35.23 and 35.27, both CARD) during the same trip to the operating room. Complete one CARD *Denominator for Procedure* form because ICD-9-CM codes 35.23 and 35.27 fall in the same operative procedure category [CARD] (see Table 1).
- 4. Bilateral Procedures:** For operative procedures that can be performed bilaterally during same trip to operating room (e.g., KPRO), two separate *Denominator for Procedure* forms are



completed. To document the duration of the procedures, indicate the incision time to closure time for each procedure separately or, alternatively, take the total time for both procedures and split it evenly between the two.

5. **More Than One Operative Procedure Through Same Incision Within 24 Hours:** If a patient goes to the operating room more than once during the same admission and another procedure of the same or different NHSN procedure category is performed through the same incision within 24 hours of the end of the original operative incision, report only one *Denominator for Procedure* form for the original procedure, combining the durations for both procedures. For example, a patient has a CBGB lasting 4 hours. He returns to the OR six hours later to correct a bleeding vessel (OTH). The surgeon reopens the initial incision, makes the repairs, and recloses in 1.5 hours. Record the operative procedure as one CBGB and the duration of operation as 5 hour 30 minutes. If the wound class has changed, report the higher wound class. If the ASA class has changed, report the higher ASA class. Do not report an 'OTH' record.
6. **Patient Expires in the OR:** If a patient expires in the operating room, do not complete a *Denominator for Procedure* form. This operative procedure is excluded from the denominator.
7. **Laparoscopic Hernia Repairs.** Laparoscopic hernia repairs are considered one procedure, regardless of the number of hernias that are repaired in that trip to the operating room. In most cases there will be only one incision time documented for this procedure. If more than one time is documented, report the total of the durations.
8. **Open Hernia Repairs:** Open (i.e., non-laparoscopic) hernia repairs are reported as one procedure for each hernia repaired via a separate incision, i.e., if two incisions are made to repair two defects, then two procedures will be reported. It is anticipated that separate incision times will be recorded for these procedures. If not, take the total time for both procedures and split it evenly between the two procedures.
9. **Laparoscopic Hysterectomy – HYST or VHYS:** When assigning the correct ICD-9-CM hysterectomy procedure code, a trained coder must determine what structures were detached and how they were detached based on the medical record documentation. The code assignment is based on the surgical technique or approach used for the detachment of those structures, not on the location of where the structures were physically removed from the patient's body. Therefore, a total laparoscopic HYST procedure will have detachment of the entire uterus and cervix from the surrounding supporting structures via the laparoscopic technique. A laparoscopically-assisted VHYS involves detachment of the uterus and upper supporting structures via laparoscope but the lower supporting structures and cervix are detached via vaginal incision.
10. **A Single NHSN Operative Procedure With Multiple Incisions:** Some operative procedures have more than one incision (e.g., CBGB; CEA; colostomy reversals (COLO); FUSN or RFUSN with anterior and posterior approaches; PVBV; single breast (BRST) procedure with



multiple open or laparoscopic incisions; BRST with Transverse Rectus Abdominis Myocutaneous [TRAM] flap). Complete only one *Denominator for Procedure* form for such procedures as long as any of the incisions is primarily closed. Record the duration as time from skin incision to closure of the primary incision. See [Numerator Data](#) Reporting Instructions in this chapter for how to report SSI.

11. **Incidental Appendectomy:** An incidental appendectomy is not reported as a separate appendectomy (APPY) procedure.

12. **XLAP:** For an exploratory laparotomy that results in a procedure from another category being performed, do not report XLAP; instead report only the other procedure. For example, for an exploratory laparotomy that results in a hemicolectomy (COLO), report only a COLO.

Data Analyses: The Standardized Infection Ratio (SIR) is calculated by dividing the number of observed infections by the number of expected infections. The number of expected infections, in the context of statistical prediction, is calculated using SSI probabilities estimated from multivariate logistic regression models constructed from NHSN data during a baseline time period, which represents a standard population's SSI experience.³

NOTE: The SIR will be calculated only if the number of expected HAIs (numExp) is ≥ 1 .

$$\text{SIR} = \frac{\text{Observed (O) HAIs}}{\text{Expected (E) HAIs}}$$

While the SSI SIR can be calculated for single procedure categories and for specific surgeons, the measure also allows you to summarize your data across multiple procedure categories while adjusting for differences in the estimated probability of infection among the patients included across the procedure categories. For example, you will be able to obtain one SSI SIR adjusting for all procedures reported. Alternatively, you can obtain one SSI SIR for all colon surgeries (COLO) only within your facility.

SSI rates per 100 operative procedures are calculated by dividing the number of SSIs by the number of specific operative procedures and multiplying the results by 100. SSI will be included in the numerator of a rate based on the date of procedure, not the date of event. Using the advanced analysis feature of the NHSN application, SSI rate calculations can be performed separately for the different types of operative procedures and stratified by the basic risk index.

The basic SSI risk index assigns surgical patients into categories based on the presence of three major risk factors:

1. Operation lasting more than the duration cut point, where the duration cut point is the approximate 75th percentile of the duration of surgery in minutes for the operative procedure.
2. Contaminated (Class III) or Dirty/infected (Class IV) wound class.
3. ASA score of 3, 4, or 5.



The patient's SSI risk category is simply the sum of the number of these factors present at the time of the operation. Calculating SSI rates with this option provides less risk adjustment than is afforded by the multivariate logistic regression model used in the calculation of the SIR (see above).

Descriptive analysis options of numerator and denominator data are available in the NHSN application, such as line listings, frequency tables, and bar and pie charts. SIRs and SSI rates and control charts are also available. Guides on using NHSN analysis features are available <http://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html>.

¹Data from the National Hospital Discharge Survey. Retrieved from http://www.cdc.gov/nchs/data/nhds/4procedures/2010pro_numberpercentage.pdf.

²Magill SS, Hellinger W, et al. Prevalence of healthcare-associated infections in acute care facilities. *Infect Control Hosp Epidemiol* 2012;33(3):283-91.

³Yi M, Edwards JR, et al. Improving risk-adjusted measures of surgical site information for the National Healthcare Safety Network. *Infect Control Hosp Epidemiol* 2011; 2(10):970-986.

⁴Awad SS. Adherence to Surgical Care Improvement Project Measures and post-operative surgical site infections. *Surg Infect* 2012 Aug. 22 Epub ahead of print.

⁵Condon RE, Schulte WJ, Malangoni MA, Anderson-Teschendorf MJ. Effectiveness of a surgical wound surveillance program. *Arch Surg* 1983;118:303-7.

⁶Society for Healthcare Epidemiology of America, Association for Professionals in Infection Control and Epidemiology, Centers for Disease Control and Prevention, Surgical Infection Society. Consensus paper on the surveillance of surgical wound infections. *Infect Control Hosp Epidemiol* 1992;13(10):599-605.

⁷Haley RW, Culver DH, White JW, Morgan WM, Emori TG, Munn VP. The efficacy of infection surveillance and control programs in preventing healthcare-associated infections in US hospitals. *Am J Epidemiol* 1985;121:182-205.

⁸Centers for Disease Control and Prevention. Guideline for prevention of surgical site infection, 1999. *Infect Control Hosp Epidemiol* 1999;20(4):247-278.

⁹Facilities Guidelines Institute. Guidelines for design and construction of health care facilities. American Society for Healthcare Engineering; Chicago IL; 2010.

¹⁰Anonymous. New classification of physical status. *Anesthesiology* 1963;24:111.